



# Misconstrued land use in Vohibazaha: participatory planning in the periphery of Madagascar's Mantadia National Park<sup>☆</sup>

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## Abstract

At the end of the 1996–1997 farming season, several groups of farmers were expelled from land inside the Mantadia National Park in eastern central Madagascar, leaving them struggling to salvage meager harvests from fields within the village's oldest cultivated lands. This paper examines the roots of this crisis, examining the history of traditional land-use practices as mediated by relations with national and international institutions. Drawing on concepts recently elaborated in the political ecology and common property literature, the paper demonstrates how the crisis was avoidable, and explores the possibilities for more productive co-management arrangements. © 2002 Elsevier Science Ltd. All rights reserved.

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## Introduction

At the end of the 1996–1997 farming season, several groups of farmers were expelled from the most fertile lands in the community of Vohibazaha, in eastern central Madagascar. The farmers had been using land inside the Mantadia National Park under a trial arrangement aimed at promoting sustainable (i.e., sedentary) agriculture, in order to avoid further deforestation. The subsequent season found the farmers struggling to salvage meager harvests of their staple upland rice crop from fields within the village's oldest cultivated lands. The use of this land indicated both the gravity of the land shortage provoked by the expulsion, and the flexibility of community institutions in responding to the crisis. This paper examines the roots of this

crisis, examining the history of traditional land-use practices as mediated by relations with national and international institutions, illustrating the complexity of the task faced by a conservation project in developing truly collaborative relationships with local communities. The paper draws on concepts recently elaborated in the political ecology and common property literature to understand how the crisis might have been avoided, and to explore possibilities for more productive co-management arrangements.

The paper is organized chronologically, tracing land management in Vohibazaha through the century since its initial settlement, examining the traditional land management system and the effects of colonial and post-colonial land-use policies regarding resource conservation and exploitation. This environmental history reveals an increasingly fine subdivision and specialization of access to, and use of, the village's land resources. This situation is first explored using the concept of “tenure niches” developed by Bruce and Fortmann (1989) to move beyond simple, dualistic contrasts between “traditional” and “modern” systems of tenure in the social forests of Zimbabwe. A tenure niche is “a space in which access to and use of a resource is governed by a common set of rules, a particular tenure” (Bruce et al., 1993, p. 627). This is certainly not the first use of the niche concept in human ecology (e.g., Barth,

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1956; Coe and Flannery, 1964; see also reviews in Hardesty, 1975 and Moran, 1990, 2000), but while such concepts are often invoked in a metaphorical sense, niche is used here in explicit recognition of the purposeful exploitation of local agro-ecological variation documented by Richards in Nigeria and Sierra Leone (1983, 1985). The construct is useful in understanding the spatial arrangement of land-use practices in relation to both the agro-ecological opportunities and constraints present at the locale, and the local institutional forms that have evolved to manage these land resources.

The paper shows that while land-use practices and the rules governing access to land in Vohibazaha have become increasingly complex through interaction with outside forces, outsiders' perceptions remained rooted in myopic views of "traditional" tenure practices. For example, studies conducted in the region on behalf of the World Bank (Keck et al., 1994) and the UN Food and Agricultural Organization (Schoonmaker-Freudenberg, 1995) contrasted the standard, traditional rules governing access to land in an idealized Betsimisaraka community with a "modern" system of formal land registration. The present analysis of land tenure in Vohibazaha follows the lead of Rocheleau (1997) who built on the work of Bruce and others in understanding the nuances of local systems of land management in differentiating the text, context and subtext of the commons under an expanded definition encompassing shared land resources more generally:

The commons as *text* is a legally recognizable two-dimensional space that can be mapped and bounded. The commons as *context*...refers to the qualities...that suffuse a place, that support a whole suite of resources and practices. The commons as *subtext* is based upon social practices and belief systems and is rooted in the moral economy that governs contingently communal resources (Rocheleau, 1997, p. 4–5).

The history of land use in Vohibazaha is presented in order to explicate the shortcomings of an international project intended to assist the community in developing sustainable agriculture in a proposed "buffer zone" inside the Mantadia National Park. Despite initial efforts to familiarize project staff with the local communities using "rapid appraisal" techniques, much of the biophysical and institutional landscape remained obscure to these outsiders. It is argued that the misperception of the context and subtext of land management in Vohibazaha and other communities led to the design of ineffective project interventions that failed to provide a solution to the land shortage provoked by the closing of the agricultural frontier through the creation of the National Park. The paper describes a subsequent, less rapid community land-use mapping exercise undertaken in Vohibazaha in which community members

constructed their own land-use map in contrast to those being generated by highly trained and equipped project staff. This re-textualization, or "counter-mapping" (Peluso, 1992), enabled project staff to better appreciate the realities of land-use practices in Vohibazaha and other communities, and led to the consideration of a broader range of possible solutions to the land crisis facing the community, and the enforcement challenge faced by the National Park.

### Traditional (indigenous) Vohibazaha

Vohibazaha is a Betsimisaraka farming community of approximately 640 people, located in the steep hills between Madagascar's central plateau and the Indian Ocean. Like virtually everyone else in the region, the community's residents practice shifting cultivation of upland rice, a practice known locally as *tavy*, in an area rising from the Sahatandra River (approximately 400 m elevation) in the east, to peaks of over 1000 m to the west (Fig. 1). These mountains form part of the island's eastern escarpment that intercepts moisture-laden winds from the Indian Ocean, yielding rainfall almost every day, punctuated by periodic cyclones during the monsoon season. The region's highly endemic rainforest provides habitat for some of the island's famed biodiversity.

The Sahatandra River and its tributaries bound the village to the north and east, while the residents of the neighboring community of Volove farm the land to the south. Residents recognize no exact boundary between the villages, but the *terroir villageois* of Vohibazaha is on the order of 3000 ha. Vohibazaha is typical of villages in the region in having a permanent residential nucleus in which each family maintains a house, though these are only fully occupied during the few months following the rice harvest—for the remainder of the year, most of the family inhabits temporary structures adjacent to their *tavy*.

The precise duration of human occupation of the *terroir villageois* of Vohibazaha is unclear, but interviews with residents suggest that initial settlement occurred in the first decade of the 20th century (Sodikoff, 1996). Residents explain that the first settlers first cleared the flanks of a hill called Vohilambo, just east of the current village's nucleus, for *tavy* production (Fig. 2). They suggest that the selection of the site had a defensive motive—the rocky outcrop at the top of the hill constituted a ready refuge of difficult and dangerous access for those unfamiliar with the locale.

*Tavy*, like swidden systems in other parts of the world, involves the cutting of vegetation (and girdling of large trees), which is left to dry and then burned in preparation for the manual planting of rice grains with the aid of a dibble stick. Clearing tends to take the form

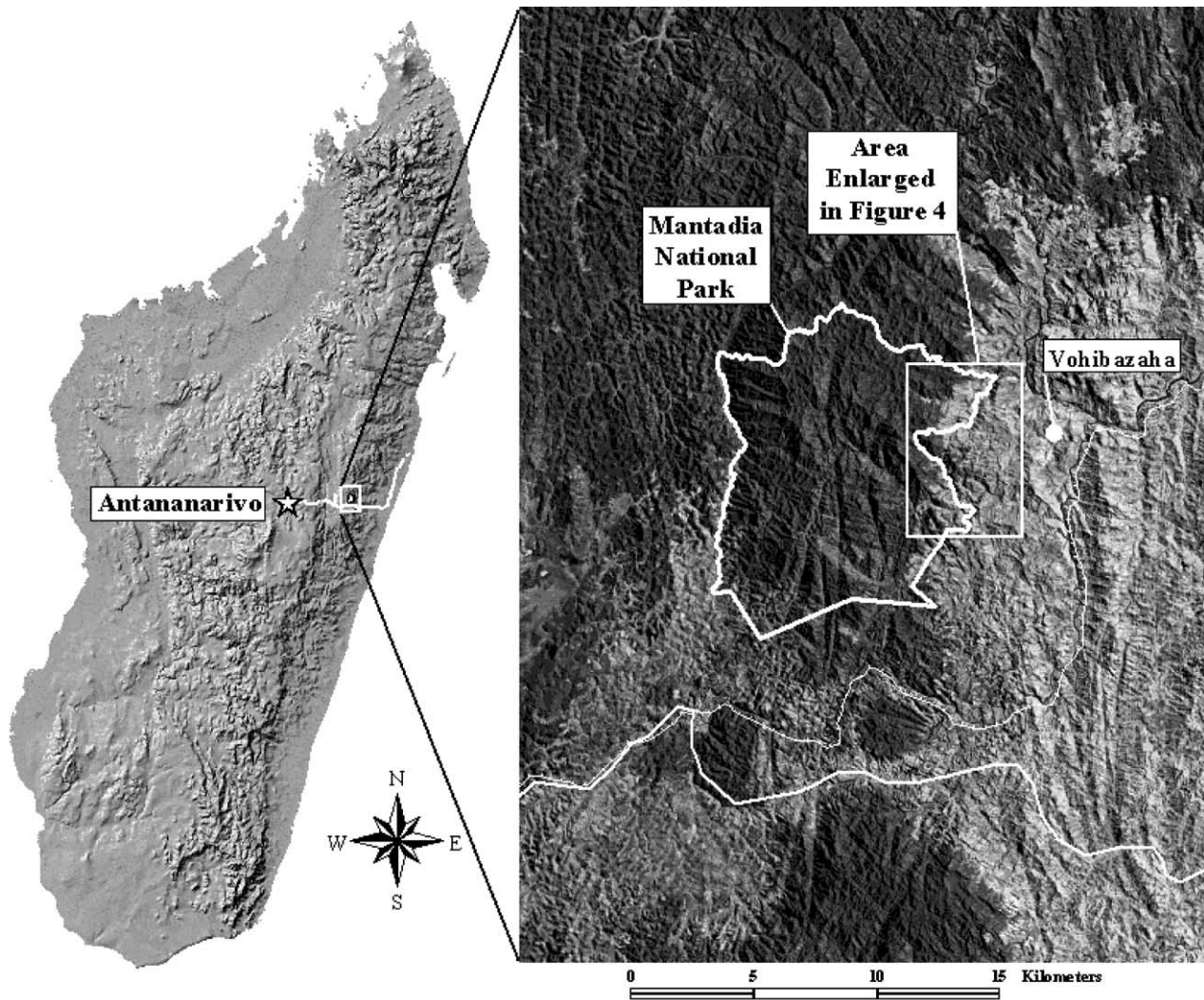


Fig. 1. Vohibazaha and its neighbor, the Mantadia National Park, are situated on Madagascar's eastern escarpment, just half a day's drive from the capital, Antananarivo. The Park boundary, superimposed on a Thematic Mapper satellite image from 1993, can be seen to encompass a block of forest, while land to the east and south had been cleared for agriculture. The country's main highway and railroad, linking the capital with the main port at Tamatave, pass to the south of the Park.

of strips of land running up-slope to the ridge line. A field cleared in this way may be cultivated for a second season, but is typically left in fallow, known according to the degree of regeneration, as: *ramasarana* (just harvested); *dedeka* (1–2-year fallow), *savoka* (3–10-year fallow) *jingeranto* (secondary forest) (IFRI, n.d. CRC/Madagascar Report).

The term *jingeranto* is also used more generally to refer to fallow that is ready for cultivation, and the rights to re-use this *jingeranto* rest in perpetuity with the farmer who originally cleared it. The borrowing and lending of these lands constitutes a central aspect of social relations in such farming communities, along with reciprocal labor exchange (Bloch, 1971; Laney, 1999). Within these fallow lands are found small stands of trees protected by taboo, or *fady*, which residents explain

result from bad luck that befell someone who once tried to clear the land (Sodikoff, 1996, p. 42), or from the presence of particular plant species (e.g., a palm called *menavozonona*) considered an indicator of poor soils.

One of the most remarkable aspects of Malagasy society is the ubiquitous reverence for ancestors and their physical remains which, in some parts of the island, includes periodic exhumation and celebration, called *famadihana*. While the *famadihana* is not practiced in this region, families do maintain permanent tombs on the crests of hills. The initial settlers of Vohibazaha established a family tomb on *Vohilambo*, and access to the lands immediately surrounding the tomb is governed under a special form of tenure, known as *sembontrano*. The clan patriarch, or *tangalamena*, is charged with ensuring compliance with a covenant that stipulates the



Fig. 2. The roofs of the permanent residences of Vohibazaha are just visible on a low ridge in the middle of the basin that drains eastward into the Sahatandra River. The peak known as Vohilambo, which was the site of initial village settlement, dominates the landscape.

sacrifice of a zebu before this *sembontrano* land may be used for *tavy* production. Other authors have identified further restrictions on *sembontrano* lands, such as a requirement that they be left in fallow for a minimum of 8 years (Aeberhard, 1992 (cited in Keck et al., 1994)).

This settlement process results in a concentric arrangement of land management units with a ridge line gap in the forest matrix containing the family tomb at its center, surrounded by land tightly controlled under the *sembontrano* covenant. Access to *jingeranto* land more distant from this core is controlled under a less strict regime, and is dotted with taboo (*fady*) stands of trees whose use is completely forbidden. Already in this idealized form, the system is composed of at least four quite distinct tenure compartments, whose spatial arrangement is closely related to the local topography and therefore agro-ecology. The high ridges upon which the family tombs are located are characterized by rocky outcrops which provide stones for the construction of the tomb as well as stelae erected in remembrance of particular individuals. The thin soil of these ridges, and most upper slopes, are of low agricultural potential. In addition, these areas are the most exposed to the cyclones that have swept the region several times since the founding of the village.

The permanent residential core is located on a lower, narrow ridge, and below each house are found the family's banana, coffee and other tree crops, some of which are destined for sale. The location of these crops insures that they benefit from close surveillance and

continual maintenance, as well as fertilization from crop residues and other organic by-products, much as in Nepal and Rwanda (Clay and Lewis, 1990). *In toto*, the household agroforestry plots and various forms of *tavy* constitute the exploitation of micro-environmental variation, and are managed under different forms of access.

This proto-typical village landscape thus comprises a set of distinct agro-ecological and tenure "niches" (Bruce et al., 1993). The geographic particularities of this place constituted the context within which successive generations would have reconfigured the landscape according to the Betsimisaraka cultural subtext of social practices and belief system. However, in the wider context of export-driven resource extraction, external forces would deploy the tools of property as text to assert quite different visions of appropriate patterns and processes in the landscape.

### Colonial (exogenous) Vohibazaha

Notwithstanding the idealized portrait presented above, both the timing and location of Vohibazaha's settlement make it an unlikely exemplar of traditional, indigenous Betsimisaraka land-use practices. The founding of the village of Vohibazaha occurred at just about the time that the Merina monarchy, which had consolidated the island a century before, was losing its long struggle against annexation by France. It is unclear

whether the village's name—literally, “place of the outsider”—refers to the conspicuous presence of French colonists at the locale, or to the fact that the village was formed by successive waves of immigrants attracted by their industrial enterprises. The influence of indigenous (royal), and foreign (colonial), administrations had increasingly strong impacts on land management in Vohibazaha.

The Malagasy monarchy from its inception at the beginning of the 19th century claimed the island's forests as its inalienable domain, but edicts forbidding *tavy* in order to protect those forests were at times relaxed in order to ensure that the regime's soldiers would not be tied to permanent rice paddies which would hinder their mobilization (Dez, 1968 (cited in Coulaud, 1973); Gade, 1996; Olson, 1984; Vérin, 1954). These edicts assumed textual stature in the famous 305 *Articles* legislation of 1881, though such policies could carry little practical implication for communities as remote from the highland capital as Vohibazaha (Keck et al., 1994). French forces were finally able to secure the capitulation of the Merina monarch in 1896, and while the new administration's attitudes towards environmental transformation largely echoed those of its predecessors, colonial policies were more far-reaching and were enforced with greater speed and vigor. So, while the French government followed suit in claiming all Malagasy forests as state property, its management ambitions and capabilities were much greater. French colonial policy around the world was directed toward the production of agricultural surpluses for export (Isnard, 1971), and several intertwined aspects of this policy affected land-use practices in Vohibazaha, particularly the improvement of transportation infrastructure, support for commercial extraction of forest resources, and the regulation of traditional land-use practices.

The colonial government accelerated and expanded the Merina monarchy's investments in transportation infrastructure beyond the highlands, using the same *corvée* (forced labor) system to facilitate the production and evacuation of sufficient agricultural surpluses to allow for exports (Olson, 1984). Central to this goal was the construction and operation of two railways, one of which connected the main eastern port, Toamasina, with the highland capital, Antananarivo. Besides the clearing of the actual routes for the train lines, considerable amounts of forest were cut to provide the hundreds of thousands of “sleepers” for the tracks and for fuel for the locomotives (Bertrand, 1999; Olson, 1984; Razakamarina et al., 1996). These projects opened up new portions of the forest to accelerated settlement by emigrant workers from other parts of the island, and laid the foundations for industrial enterprises involving the extraction of natural resources including minerals and lumber. Vohibazaha is immediately adjacent to this

line, and its settlement coincides quite closely in time with the construction of the railway.

In the year of French annexation, a forestry administration was established to “reconnoiter the forests, explore their rational exploitation, and assure the control of concessions” (Ramanantsoavina, 1963, p. 230 (cited in Coulaud, 1973, p. 323)). Commercial logging generated government revenue through the rents from the logging of forest “concessions”, or tracts of land to which the rights of extraction were granted, largely to foreign enterprises. In 1921 about 600,000 ha were offered, and while initial response was slow, by the end of the colonial era some 300,000 ha of former forest land had been converted to cash crop production (Gade, 1996; Olson, 1984).

Such commercial exploitation under colonial rule may have been responsible for the removal of around a million hectares of forest island-wide, and certainly had a dramatic effect in locations near the rail lines themselves (Boiteau, 1958; Hornac, 1940 (cited in Jarosz, 1993)). The owners of forest concessions would often extract the few trees of commercial value from an area and pay their workforce, in part or entirely, by allowing them to clear and burn parcels for planting, often leading to the establishment of villages (Coulaud, 1973; Vérin, 1954). The control of abusive practices was poor:

The Forest Service was unable to regulate resource extraction due to shortages of labor power and capital, as well as lack of political will. Infractions such as clear-cut and the burning of forests were often overlooked by forestry inspectors, because they stayed at the homes of concession owners while touring their districts. (Jarosz, 1993, p. 375)

This region was certainly affected by such dynamics. The visible evidence includes railroad spurs built to facilitate logging in Vohibazaha and neighboring communities, and sawmills and graphite mining has been central to the local economy since the colonial era (Sodikoff, 1996). One of the main impacts on settlement patterns stems from the fact that successive groups of immigrants settled in close proximity to previous arrivals, and established their own tombs and corresponding *sembontrano* lands. These groups coalesced under colonial policies requiring the grouping of dwellings in order to facilitate tax collection (Jarosz, 1996), considerably complicating traditional land management institutions.

While the French sought increased agricultural production through the granting of concessions and infrastructure investments to support them, they feared that uncontrolled extension of the traditional practice of shifting cultivation, or *tavy*, would lead in a very short time to the loss of the island's entire forest cover. The colonial regime continued to issue restrictions on

land-use practices, especially *tavy*, though these policies vacillated between more and less restrictive rules throughout the next decade until culminating in a 1913 law banning shifting cultivation altogether (Jarosz, 1993; Kull, 2000). The colonial administration once again revised its approach in the 1920s, creating forest reserves from which local residents were excluded, and around which land use was restricted (Gade, 1996; Marcus and Kull, 1999; Olson, 1984).

Older residents of Vohibazaha recall colonial inspectors using the line of vision defined by the brim of their cap to demarcate lower slopes which could be cleared, while upper slopes were meant to remain forested. They also recall the development of irrigated fields being made a pre-condition for approval for the clearance of uplands. Similar programs by the British colonial authorities to encourage bench terracing in Kenya are said to have left a legacy that undermines soil and water conservation efforts to this day (Blaikie and Brookfield, 1987). Strict enforcement of the ban on *tavy* in the nearby coastal commune of Vatomandry, where the topography favored the creation of paddies, led farmers to relocate to areas such as Vohibazaha's neighboring commune of Beforona,<sup>1</sup> where restrictions were being applied with less vigor because there was less irrigable land. Once farmers began moving into these areas to avoid the ban, enforcement was strengthened (Jarosz, 1993). The "administrative incoherence" of vacillating and unevenly applied and often draconian policies were largely unsuccessful at slowing deforestation (Coulaud, 1973, p. 324). Instead, it has been suggested that such an institutional environment encouraged illicit and uncontrolled—and therefore much more destructive—use of fire for the clearing of land and constituted a deep source of resentment towards the colonial regime on the part of the rural population (Kull, 1999).

Resistance to these and other policies led to several uprisings against the French regime in Madagascar. The nearby regional center of Moramanga, a major station on the Tamatave–Tananarive railway, gained worldwide notoriety as the site of violent insurrection and brutal retaliation in the Spring of 1947. These events have been described as possibly "the world's most bloody colonial repression" (Bloch, 1971, p. 29).

Over the course of the 19th and 20th centuries, control over much of the land resources of Madagascar was shifted out of the customary domain, where it had been rooted in the subtext of local practices and belief systems, to the formal domain based on juridic texts

delimiting explicit and exclusive rights to outsiders. At the same time, Royal Merina and French Colonial policies both challenged traditional land management institutions and, in communities like Vohibazaha, had direct effects on land settlement patterns. In the case of Vohibazaha, a dozen distinct lineage groups coalesced into a single village, but maintained three separate tombs and corresponding *sembontrano*. Subsequent intermarriage further complicated the traditional rules governing access to other fallow lands. While the conflation of lineages is common in Malagasy villages, the number of lineages in Vohibazaha is exceptional. Such nuances, however, are rarely mentioned in the published work on "traditional" community organization in this part of Madagascar, leaving outsiders with a simplistic, idealized, view of the structures with which they are about to interact.

In Vohibazaha, the railroad not only attracted settlers with a history of wage employment with railroad and related extractive industries—it also continues to provide outlets for agricultural produce not enjoyed by otherwise similar communities in the region. Thus by the end of the French colonial era, the subtext of indigenous (Betsimisaraka) and external (Merina and French) visions of appropriate patterns and processes on the landscape were intricately intertwined.

### Peripheral Vohibazaha

Madagascar regained its independence in 1960, and a relaxation of many colonial policies ensued, including regulations on forest clearing. By the end of the Second Republic—the socialist era of Didier Ratsiraka—government ranks had tripled, while the abolition of the head tax decimated government revenues, leaving the forest service hard-pressed to enforce even these more relaxed policies (Vérin, 1992). By the mid-1980s, international concern had mounted over continuing destruction of the island's forests, noted by the earliest European explorers and increasingly quantified by the analysis of aerial photographs and satellite images (e.g., Faramalala, 1988; Green and Sussman, 1990; Mayeaux et al., 2000; Nelson and Horning, 1993). As a result, Madagascar became one of the first countries to adopt a National Environmental Action Plan (NEAP) (Kull, 1996; Larson, 1994).

The mountain forests near Vohibazaha harbor major populations of several species of lemur, including the largest, and endangered, *Indri indri*. The presence of the *indri* and other spectacular flora and fauna within a day's drive of the capital made this forest a prime candidate for elevation to "protected area" status under the NEAP, and in 1989 the agricultural frontier of more than a dozen communities was officially closed by the

<sup>1</sup> A great deal of interesting applied research has been carried out in and around Beforona under the *Terre Tany* project, and its successor, the *Projet Bilan Ecologique à Madagascar* (BEMA). In addition to several dissertations, a series of detailed research reports was published as Cahiers Terre-Tany, which are available from <http://www.cde.uni-be.ch/programmes/africa/afr25.html> (see also Messerli, 2000).

demarcation of the 10,000 ha Mantadia National Park.<sup>2</sup> Four years later, the Park and a neighboring 810 ha Special Reserve<sup>3</sup> were consolidated as the Andasibe–Mantadia Protected Area Complex (APAM),<sup>4</sup> to be managed under a new Integrated Conservation and Development Project (ICDP). The ICDP concept was styled after the Biosphere Reserve design, with a heavily restricted “pristine” core, surrounded by buffer and transition zones where certain non-extractive activities (e.g., research, tourism) are permitted. This design is meant to “reduce human pressure on the protected area”, with slowing rates of deforestation as the key indicator of project success. The ICDP approach aims to protect intact portions of rainforest while generating tourist revenue, which is to be used both to manage the Park, and to fund development activities that provide incentives for communities to collaborate in the conservation of forest resources.

At the time the National Park was created, land tenure in the rest of the region remained largely under the control of traditional community institutions. A 1994 World Bank study of the region described the tenure situation as follows:

Almost 65 percent of the 183 individuals surveyed consider themselves owners of their land. Although they consider themselves owners, most land controlled by the region’s farmers is technically public land. Only 5 percent of the total survey sample have legal documentation of land ownership. This highlights how rare the modern, formal system of land tenure still is in this region. Some land is registered by the province but most of the land remains both non-cadastral and untitled, thereby belonging to the state by default. Land titles are held by the mining companies, the railroads, and private and [sic] forestry enterprises (Keck et al., 1994).

The APAM Project was funded by the US Agency for International Development’s Sustainable Approaches to Viable Environmental Management Project. An American firm, Volunteers in Technical Assistance, was contracted to implement the 5-year project, with subcontracts to a Malagasy non-governmental organization (NGO) called SAF-FJKM,<sup>5</sup> and Clark University<sup>6</sup> to provide technical assistance in the community development and planning components of the project (Razakamarina et al., 1996).

The APAM Project quickly deployed an impressive array of geomatic technologies—remote sensing, geographic information systems, and global positioning system surveys—to map the extent and content of its territory, as well as that of its neighbors, the communities in the so-called *zone périphérique*. On the basis of this surveying and mapping, the APAM Project was able to prepare a draft Management Plan, a major project objective required for the hand-over of the Park management to the nascent National Park Service<sup>7</sup> in 1997. The management plan proposed the delineation of three zones, based on ecological and infrastructural criteria (e.g., habitat sensitivity, level of disturbance and accessibility).

The proposed zones included: strict conservation; scientific research; and tourism, with access to these “niches” to be restricted to Park Service staff, approved scientists, and fee-paying tourists, respectively. While all extractive uses, particularly logging, would be strictly forbidden, it was clear that a good deal of natural resource-based livelihood activities were continuing to take place in the forest, both by local residents, and by a variety of others interested in timber and non-timber forest products and semi-precious stones (Sodikoff, 1996). Moreover, in the interval between the demarcation of the Park and the start up of the APAM Project, enforcement of the boundary had been sufficiently lax that farmers in the surrounding communities had continued to create new *tavy* along the edge of the forest, effectively “encroaching” on the protected area in order to extend their agricultural lands.

Development activities were initiated in this “peripheral” zone with a range of “participatory rural appraisal” (PRA) exercises to quickly help communities define and prioritize their needs so that interventions could be launched with some hope of completion within the short time frame of the project. Building on the repertoire of Rapid Rural Appraisal techniques (Chambers, 1980; McCracken et al., 1988), PRA centers on group discussions to elicit information in visual formats, such as sketch maps, land-use transects, historical trend lines, institutional “Venn” diagrams (Fig. 3), and culminates in a problem matrix and a community action plan (Razakamarina et al., 1996).

An APAM team carried out PRA exercises in five villages, including Vohibazaha and Volove, in January of 1993—thus spending less than a week in each community. Not surprisingly, overcoming the land constraint imposed by the enforcement of the Park boundary was a top priority in all communities. This expressed need coincided well with the APAM project’s

<sup>2</sup>The Mantadia National Park was established by Décrée. NE 89.011 on January 11, 1989.

<sup>3</sup>The Analamazoatra Special Reserve was created by Arrêtée NE 2778-MAER/SEGREF/FOR on July 21, 1970.

<sup>4</sup>*Aires Protégées d’Andasibe-Mantadie*.

<sup>5</sup>Sampan ‘Asa Momba ny Fampandrosoana (SAF)-Fiagonan’i Jesoa Kristy eto Madagasikara (FJKM).

<sup>6</sup>Program for International Development, Clark University, USA.

<sup>7</sup>The *Association National pour la Gestion des Aires Protégées (ANGAP)* was created to coordinate the ICDPs, with the goal of becoming a new national park service with direct managerial control of the system of protected areas.

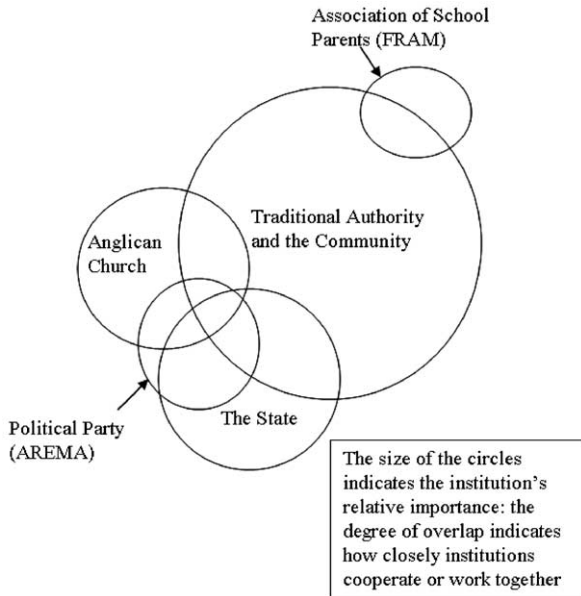


Fig. 3. The Institutional “Venn” diagram for Vohibazaha, developed during the PRA in January, 1993 (Razakamarina et al., 1996, p. 23).

goal to stabilize the edge of the forest, and the project regarded the promotion of intensive, sustainable agriculture in the zones of encroachment as a useful approach to achieving this goal.

To this end, APAM officials began to consider the creation of a fourth Park management zone, essentially a special buffer zone for “controlled occupancy and use” (Figs. 4 and 5). Meanwhile, the Malagasy NGO project partner, SAF-FJKM, drafted a contract stipulating conditions under which farmers would agree to manage this proposed buffer zone, including restrictions on land use according to slope gradient, and more than a dozen soil and water conservation measures to be implemented in *tavy* fields (SAF-FJKM, 1995). While the farming of these lands was formally forbidden, APAM officials agreed to seek ratification of the contract by the Ministry of Waters and Forests, who retained legal responsibility for the Park. Four “user groups” of farmers were formed to implement this scheme in Vohibazaha, and a training exercise was carried out in which participating farmers were paid to set up test plots, the harvests from which would be compared to harvests from nearby “control” plots.

As the agricultural intensification effort was getting started, the Park Service commissioned a set of true-color, high-resolution, vertical aerial photographs of the Park and the surrounding area, to enable precise monitoring of deforestation activities. The APAM Project decided to experiment with the use of these photos for land-use planning, and generated a poster-sized mosaic of photographs covering Vohibazaha at a scale of about 1:8000 (Ford and McConnell, 2001). The

mosaic clearly showed the roofs of houses and tombs, the boundaries of new and recent *tavy* fields, and many other artifacts of local land-use practices. At the end of the agricultural season, the poster was brought to the community as a planning tool, and to facilitate communication with project staff.

Without any instruction, participants oriented themselves to the bird’s eye perspective of the mosaic, and undertook an interpretation using colored grease pencils on a clear overlay (Fig 6). The features interpreted, in order, included the village center, streams, trails, *tavy*, the school, and household granaries. At the request of project staff, participants labeled each of the *tavy* fields according to the name of the owner. The interpretation also revealed more than two dozen intensively managed gardens (*tanimboly*), many times more than the project staff had previously known existed.

Field verification of the interpretation took project staff into parts of the village land they were not accustomed to visiting, as they had heretofore concentrated mainly on the proposed buffer zone. In particular, the verification exercise took project staff to several of the *tanimboly* which had previously been overlooked, as they are often tucked away in valley-bottoms to take advantage of the shelter provided from periodic cyclones, as well as the humidity and fertility of their soils. Enumeration of crops in just a few of these *tanimboly* revealed a dozen species (e.g., avocado, coffee, palm, oranges, grapefruit, papaya, eucalyptus, banana, jackfruit, maize, beans, chickpeas, ginger, manioc), many of which the project staff had not realized were being grown in the village. In addition, project staff learned that residents differentiate two levels of tenure rights to gardens—those with shelters (implying more permanent control) being known as *potro*.

At the same time, it became clear that the maintenance of soil and water conservation measures had been totally neglected in the demonstration plots in the proposed buffer zone. Given the failure to implement the contract stipulations, local Park Service officials felt they had to expel the farmers from the buffer zone at the end of the 1996–1997 farming season. When the time came to prepare fields for the following season, farmers sought emergency relief through the traditional *sembontrano* system, and persuaded the *tangalamena* controlling the largest and oldest *sembontrano* to temporarily relax the requirements for access to these lands. With the approval of the lineage group, he agreed to allow the lands to be cultivated earlier than would normally have been the case, and required only a measure of rum in place of the normal zebu sacrifice. Virtually all of the farmers who would otherwise have farmed the buffer zone instead farmed the *sembontrano* that season. Having cleared these—the oldest-cultivated fields in the community—before they had fully rested in fallow,



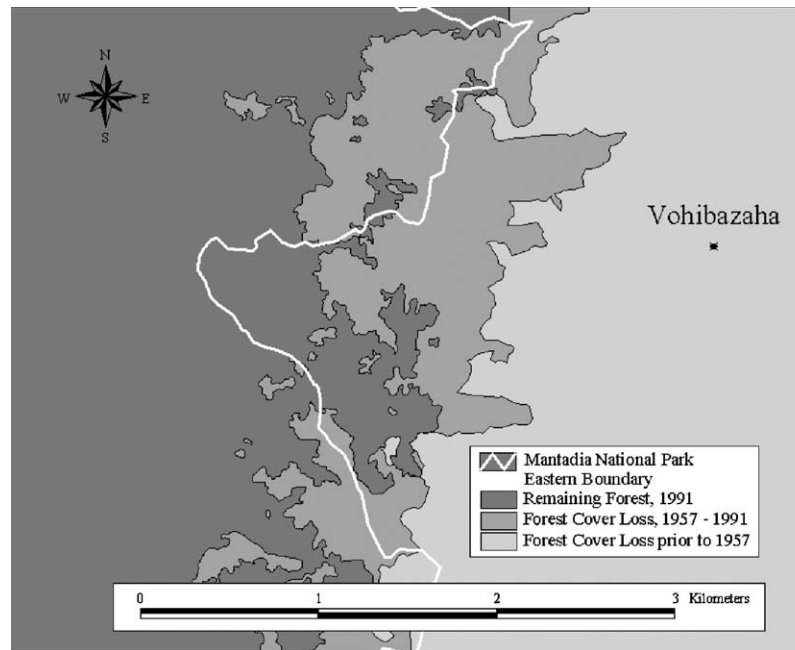


Fig. 4. A map made from aerial photographs shows that some of the land cleared for farming between 1957 and 1991 in the vicinity of Vohibazaha was within the Park boundary.



Fig. 5. The rainforest in the hills of the Mantadia National Park and recently harvested hill rice fields (light tones), scattered among young fallow fields can be seen in this view looking southeast from Vohibazaha. The stream draining this valley forms much of the Park boundary, thus fields on the far slope are inside the Park, within the proposed special buffer zone. The actual boundary of the buffer zone has never been formally delineated. At the end of the 1996–1997 season, Park Service officials expelled farmers from this zone following the demise of a plan that would have permitted continued cultivation.



Fig. 6. A community leader (foreground) explains land-use practices to Park conservation staff as they study the mosaic of aerial photographs.

farmers found this land relatively infertile, subject to major weed infestations and therefore quite unproductive. This flexibility in local institutions was critical in insuring a harvest for the season, albeit a meager one.

APAM conservation staff initially attributed the failure of the agricultural intensification efforts to the laziness, ignorance and inherent conservatism of the farmers. In a follow-up to the initial mapping exercise, project staff were able to explore the spatial patterns of land tenure and thereby the relationship between different lineages and the land they farmed. By tracing the family affiliations of each of the *tavy* farmers, project staff were able to appreciate the spatial arrangement of *tavy* fields in the community, which is grouped loosely by lineage, and corresponds roughly to the location of the tombs.

In addition, subsequent discussions shed considerably more light on the rules of access to fallow land, including individually held *jingeranto* lands, and those protected under the community's multiple *semontrano* covenants. Of particular interest, project staff learned of several gardens that had been carved from the edges of *semontrano* land. This use appeared to be a contradiction of the covenant permitting only periodic access

to these lands, since the trees planted in these gardens implied a transfer of rights to the user. In effect, these gardens and others in the village contained many of the components of intensive, permanent agricultural practices that the project had failed to incite in the buffer zone. Finally, discussion of reasons for the disuse of irrigated land in the village elicited memories of heavy-handed colonial efforts to promote paddy production.

The local Park Director has been negotiating a proposal with the Ministry of the Environment to approve the contract, and to compensate for the farmed acreage by expanding the Park with an equivalent acreage from the forest reserve immediately to the north. As of this writing, the Ministry of Waters and Forests has not ratified the agreement, citing a lack of legal authority to allow farming inside a National Park, although legislation enabling such a change of status appears to await only Presidential approval (Randriamanantenasoa, pers. comm.).

The remainder of this paper is devoted to a discussion of how the re-textualization of land tenure in Vohibazaha enabled outsiders to better appreciate the tenure niches that constitute the context and subtext of local land use.

## Discussion

The APAM Project's initiative to promote intensive, sustainable agricultural land use in the proposed buffer zone seemed like a very reasonable compromise between the goals of the National Park (to protect biodiversity), and those of the community (to insure adequate agricultural production in the wake of the closing of the agricultural frontier). I argue that this effort foundered in large part because the initial rapid appraisal approach employed did not enable project partners to adequately understand the agro-ecological and institutional landscape of the community whose livelihood practices they were attempting to modify. While the term "participatory rural appraisal" is often invoked to avoid the impression that interaction with the community is rushed, the fact that the exercises are designed to gather information rapidly is a major attraction for development agencies. Fielding multi-disciplinary teams is expensive and time-consuming, and the "pathology of surveys" (Chambers, 1983, 1997) has begun to create survey fatigue in rural communities in Madagascar, as has long been the case in other parts of Africa.

The USAID-funded APAM Project was not alone in adopting the PRA approach in order to avoid such pitfalls—it was also the methodological cornerstone of concurrent research undertaken by the FAO in nearby Anivorano (Schoonmaker-Freudenberger, 1995), and has continued to find widespread usage in the new round of biodiversity conservation efforts, particularly the Landscape Development Interventions project. I believe that the initiative in Vohibazaha would have had a different outcome had project staff better appreciated the nature of intensive agriculture already being practiced, as well as the historical contingencies of institutional forms (e.g., *sembontrano*) in the "peripheral" communities than they gained through the initial PRA exercises.

The gardening already under way in the community could probably not have been replicated in the buffer zone due to its distance from the main village center. However, the crops and techniques in use in the *tanimboly* and *potro* might have made a much more interesting starting point for intensification than did the textbook list of soil and water conservation techniques stipulated in the draft contract. A better appreciation of existing practice and a more serious discussion of appropriate techniques in the buffer zone would most likely have yielded different results.

Likewise, a better understanding of the institutional landscape would probably have led to a different form of intervention. The World Bank report discussed above (Keck et al., 1994), and the subsequent FAO study in the region (Schoonmaker-Freudenberger, 1995), both described the idealized traditional tenure system wherein a

single *tangalamena* managed the village's unique *sembontrano* lands, while access to other, *jingeranto*, land rests with the individual who cleared it. These studies note that the *sembontrano* system is widespread, but not universal; yet neither mentions the occurrence of multiple *sembontrano* in the same village. Furthermore, both reports explore the possibility that enabling more farmers to gain formal titling will incite intensification. The registration of land is not a new concept to Madagascar, which had one of the first titling programs in Africa, dating to 1896 (Schoonmaker-Freudenberger, 1995, p. 68; see also Raison, 1969). Nor is the suggestion that formal titling is key to abating land degradation in Madagascar (e.g., Gade, 1996).<sup>8</sup> Not surprisingly, neither report refers to the persuasive (Marxist) analysis of Bloch (1984) who addresses the dissonance between private property the foundations of kinship systems in Madagascar, nor to the evidence emerging from Africa and elsewhere challenging the assertion that privatization will necessarily lead to the slowing or reversal of degradation (Angelsen, 1995, 1999; Barrows and Roth, 1990; Larson et al., 1999; Ribot, 1995<sup>9</sup>).

In contrasting the idealized "traditional" system with a similarly monolithic, modern cadastre, prior studies of land tenure in Madagascar often accept a modern versus customary dualism rather than considering nuances that might suggest other possible options (Bruce et al., 1993). The FAO report is an exception, discussing the possibility of collective, rather than individual titling, though again assuming a single collective entity in each community. In the case of many of so-called "peripheral" communities of the Mantadia Park, the actual form of the traditional structures had been strongly modified by historical contingencies, such as the railroad and its associated extractive industries.

The institutional landscape of Vohibazaha, in particular, reflects a complex variant on the traditional land tenure system that already defines access to multiple agro-ecological "niches" for *tavy*, managed under at least two distinct tenure regimes (*jingeranto* and *sembontrano*), as well as several types of gardens (*potro*) and *fady* forest groves. The recognition of 12 *tangalamena* in Vohibazaha is quite unusual, blurring the typical distinction between nuclear families and extended families, or lineages. The fact that these dozen have congregated to maintain seven different tombs, and further aggregated to manage three ancestral domains, or *sembontrano*, makes the institutional form of the community quite different from the unitary circle representing "Traditional Authority and the

<sup>8</sup>In fact, formal land titling was one of the main pillars of Madagascar's 1988 Environmental Action Plan.

<sup>9</sup>See also the edited volume Land Rights in Africa (Toulmin and Quan, 2000).

Community” on the Venn Diagram drawn during the initial rapid appraisal exercise (Fig. 3).

These land tenure “niches” reflect a hierarchical, but flexible, set of social structures within the community of Vohibazaha, in large part attributable to the role of the railroad and its associated extractive industries in the settlement and subsequent evolution of land use in the region. One of the most interesting aspects of land-use patterns on Vohibazaha, and in this part of Madagascar, is how closely the idealized traditional land management system resembles the fundamental concept of the Biosphere Reserve. In its draft Park management plan, the APAM Project was able to modify the ideal, concentric biosphere design, using the geographic realities of the 10,000 ha area to guide the zonation. When it came to Vohibazaha, however, the Project concentrated solely on creating a “transition” zone in the areas already cleared within the Park boundary. They did not gain sufficient appreciation of the complexity of community land management arrangements to design a successful plan for the use of the proposed buffer zone.

In effect, the creation of the Park can be considered an eminent domain “taking” of land, which would otherwise be under the control of the “peripheral” communities. The draft contract for the use of the buffer zone constitutes a formal co-management arrangement, wherein communities “share management power and responsibility with the state...formaliz[ing] a *de facto* situation of mutual dependence and interaction in resource management” (Bruce et al., 1993, p. 628). The contract created four groups of farmers without cognizance of the “fit” between these groups and the complex set of land management institutions that had evolved to manage land resources in the community. The formation of four new “user groups” for the purposes of contracting with the APAM Project for the use of the proposed buffer zone might have happened very differently had the Project had a better understanding of the institutional dynamics in the community.

Recognition of the evolutionary nature of such institutions is key: “Tenure relations must be recognized as evolving rather than static forms of social organizations even when their legal status remains static” (Bruce et al., 1993, p. 640). Indeed, if there is to be sustainability achieved in managing resources, it will likely happen only in recognition of what Norgaard has characterized as the co-evolution of social and ecological systems (Norgaard, 1988). The initial participatory planning exercise did foster a dialogue between the communities and the ICDP staff, affording the latter a basic understanding of the existence of multiple *tangalamena* in Volove and Vohibazaha, for example. The initial exercise proved too rapid, however, to give the outsiders more than a superficial understanding of the context and subtext of land use and land tenure in Vohibazaha.

Rapid, and Participatory, Rural Appraisal are but two variants of a much larger trend towards participatory planning, which includes more in-depth approaches such as Farmer-Participatory Research (Farrington and Martin, 1988), Farmer-Back-to-Farmer (Rhoades and Booth, 1982); and Farmer First (Chambers et al., 1989; Scoones and Thompson, 1994). In Vohibazaha, the more detailed mapping exercise brought the participatory rural appraisal process back to its roots in agro-ecosystem analysis (Conway, 1986), enabling Project staff to discover and better appreciate ongoing agricultural intensification and the intricacy and pliability of community institutions (i.e., the flexibility of the *sembontrano* system in responding to the expulsion of the farmers from the proposed buffer zone).<sup>10</sup> Project staff initially blamed the failure of the agricultural development effort on the laziness and conservatism of the farmers, without considering how farmers’ lack of tenure over the lands concerned would act as a disincentive to such investments. Following the detailed mapping exercise, however, ICDP staff were much more optimistic about the prospects for promoting sustainable agriculture in the community.

The differentiation of the text, context and subtext of land use in Vohibazaha, along with the niche construct, enable us to better appreciate the spatial arrangement of land-use practices in relation to both the agro-ecological opportunities and constraints in places like Vohibazaha, and the local institutional forms that exist to manage these land resources. The inclusion of participatory mapping exercises like those described above, is an affordable and effective expansion of the PRA approach that bears consideration in future rural development efforts. The technology required for the acquisition of aerial photography and the production of image mosaics is not beyond the capabilities of development agencies. The bureaucratic imperatives of agencies like USAID, however, must be realigned to afford their contractors and subcontractors the time and resources to sufficiently appreciate the realities of the communities they work with, if they are to develop workable interventions. When such projects rush to produce results in short time frames, they risk exacerbating the very problems they set out to solve.

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<sup>10</sup> A robust collection of “tools for change” is presented by Slocum and others (1995), and a collection of experiences with participatory geomatics appeared as a special issue of *Cultural Survival Quarterly*, in Winter of 1994 (Vol. 18, No. 4).

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